FINAL REPORT

MTPE/EOS GROUND SEGMENT SYSTEMS ENGINEERING STUDY

(Task #7 of Contract No. NAS5-32588 - Global Science and Technology, Inc.)

TASK BACKGROUND

Initial work on this task was performed between September 7, 1994 and November 30, 1994. Work under a task extension started on December 1, 1994 and ended on December 30, 1994. All work under this task ceased as of close of business on December 30, 1994. Total cost to the Government was approximately $100K.

Science Applications International Corporation (SAIC) provided consulting services under a non-competitive fixed-price subcontract (purchase order) at a fully-loaded cost to the Government of approximately $10K. These services were used to augment GST's systems engineering expertise in the area of large data system design.

The ATR for this task was Mr. John Lyon, Chief Engineer, Mission Operations and Data Systems Directorate.

TECHNICAL ACCOMPLISHMENTS

Items delivered to the ATR under this task are listed below. All task products were delivered on paper as well as electronically via the network and on electronic physical media in the various formats given. View graph transparencies were also provided for the briefings. Deliveries were made at various times as required during the task performance period, and the final deliveries were made on December 30, 1994. Numerous meetings with the ATR and with others were also attended.

Basic Task #7

- EOSDIS/MTPE Documentation List (WORD file)
- Interview List (EXCEL file)
- Interviews Data Base (MORE file)
- Interviews Analysis (WORD file)
- MTPE-EOS Final Report Briefing (Power Point file)

Task # 7 Extension

- SE Assessment
  - MTPE/EOS Executive Summary Briefing (Power Point file)
- ESDIS Project Management Plan (PMP)
  - PMP Outline in TIP Format (WORD file)
  - PMP Section 3 (WORD File)
  - Documentation Tree (MORE File)
- ESDIS System Engineering Management Plan (SEMP)
  - SEMP Outline (MORE file)
- EOSDIS Science Interface
  - Interface Approach (MORE file)

The task report was developed and presented in the form of a briefing. GST presented this briefing three times to 1) Mr. Dale Fahnestock, Director of the Mission Operations and Data Systems Directorate, and his staff on November 14, 1994; 2) Dr. Robert Price, Chief of the

Mission to Planet Earth (MTPE) Office, and his staff, on November 29, 1994; and 3) Dr. John Klineberg, Director of GSFC, and members of the GSFC Executive Council on December 22, 1994.

The "Key Systems Engineering Issues" chart from the executive summary briefing is attached to this report. This chart represents the primary findings of the study. In the full report, each issue is accompanied by an "assessment" which characterizes and substantiates the issue, an "impact" which describes the consequences of not dealing with the issue, and a "recommendation" which describes how to mitigate the issue. Near-term and longer-term action plans to implement the recommendations were also given.

Recognition of the value of the study's findings and recommendations was stated by the recipients at all briefings, and the results are being used by GSFC upper management to identify and implement systems engineering improvements at MTPE program and project levels.

Other products delivered during the task extension performance period were focused on immediate needs of the Earth Science Data and Information System (ESDIS) Project. This included initial work on an ESDIS Project Management Plan and an ESDIS Project System Engineering Management Plan was completed. These plans are needed by the new ESDIS Project Manager and his management staff to define and document how the project will now be run. Also, a preliminary approach was prepared for assessing the EOSDIS science interface and recommending improvements to the systems engineering process for optimizing this interface. This approach will be used by ESDIS Project and MO&DSD Directorate office to improve the technical management of this interface.

Key Systems Engineering Issues

Causes

- √ 1. *Essential management/systems engineering partnership missing at higher levels*
- √ 2. *ESDIS Project environment makes good systems engineering extremely difficult*
- √ 3. *No complete and current program baseline (requirements, schedule, cost)*
- √ 4. *ESDIS system integration is weak, and MTPE system integration is missing*
- 5. No useful integrated critical-path schedule exists above the project level
- 6. Costs sensitivities poorly understood and provide inadequate management input
- 7. The requirements management process is not functioning adequately
- 8. Program and ESDIS Project risks are inadequately understood and managed
- 9. Operations concepts and scenarios are lagging the system design

Consequences

- √ *10. Probably cannot meet current EOSDIS requirements*
- √ *11. Likely that Science Information System objectives will not be met*
- √ *12. May not be possible to show that end-to-end system meets science objectives.*